Physical v. Chemical Changes

- Discussing MATTER
- Properties and changes of matter

- Physical Properties:
  - Any observation that can be made WITHOUT changing the composition of the matter
- Examples
  - Color
  - Phase of matter
  - Size
  - weight

  Density = $\frac{\text{mass}}{\text{volume}}$
  - Smell
  - texture
  - solubility
  - electrical and thermal conductivity
  - ductility → ability to roll into long strands
  - Malleability → ability to be bent or change shape
  - Brittleness → ability to break

- Physical Change:
  - A change in any of the physical properties.
  - Indentity of element or compound does NOT change
  - DO NOT make or break bonds

- Examples of state changes (Boil/Melt/Freeze/Evaporate):
  - Melt solid metal into liquid metal
  - Butter going from solid to liquid on a piece of toast
  - Chocolate sauce that goes from liquid to solid
  - Gaseous water condensing on side of water bottle
- Examples of change in Shape or Size:
  - Cutting a piece of wood in half
  - Breaking glass
  - Bending metal
- Signs of a Physical Change:
  - Any phase change (solid/liquid/gas)
  - change in the energy of the particles
  - What you started out with chemically is what you end with chemically

Chemical Properties:

- An observation that is dependent upon changing the chemical composition of an object.
- Characteristics that are shown as one chemical being transformed into another substance

• Examples of Chemical properties:

- Flammability
- Ability to oxidize (how substance interacts with oxygen)
- Ability to react to acid
- Ability to react to water

• Chemical Changes:

- Reactions
- Substances at the beginning of reaction are different (usually) at the end of reaction

• Examples:

- Rust
- Patina on copper
- Burning wood
- Baking muffins
- Volcanos in class → baking soda + vinegar
- Making salt

• Signs of a Chemical Change:

- Bubbles of gas appear
- Burning something
- Color change
- Temperature change as a result of reaction
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